

Jeremy Hargreaves

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Energy consultant with deep experience across the energy industry advising clients on a wide range of issues, including in integrated resource planning for higher renewable systems, distribution system and DER planning, rate design, and asset evaluation.

PROFESSIONAL EXPERIENCE

EVOLVED ENERGY RESEARCH, SAN FRANCISCO, CA

Principal, January 2018– Present

- **Resource Planning, 2018.** Performed least cost resource investment planning for confidential client across all countries in Europe using the Regional Investment and Operations platform to meet Paris Conference of the Parties CO2 reduction goals.
- **Asset Evaluation, 2018.** Evaluated confidential developer client's energy asset in the context of the changing energy system in the Pacific Northwest using the Regional Investment and Operations platform to determine how well it competes with a least cost resource portfolio.
- **Project Due Diligence, 2018.** Performed project due diligence for confidential investor client, looking at the value of an asset in the near-term and long-term in California.
- **Regional Investment and Operations platform (RIO), 2018.** Developed the next generation capacity expansion based, energy resource planning tool, designed to address the shortcomings of existing planning tools when planning for high renewables or deep decarbonization goals, and determine least cost investments for highly integrated and rapidly changing energy systems.

ENERGY & ENVIRONMENTAL ECONOMICS, INC., SAN FRANCISCO, CA

Director, June 2010 – December 2017

- **Hawaiian Electric Companies Power Supply Improvement Plan (PSIP), 2016 – 2017.** Led the development of least cost resource investment decisions necessary to reach the Hawaii policy goal of 100% renewables by 2045 for the Hawaii PSIP.
- **Orange & Rockland Non-Wires Alternatives Assessment, 2017.** Managed development of non-wires alternative economic analysis tools for Orange & Rockland for assessment of proposed distribution system upgrades and distributed energy resource (DER) investments.
- **California Energy Commission Solar + Storage Project, 2017.** Managed development of a DER evaluation tool, designed to estimate operations, costs, and benefits of DER portfolios across California and be integrated into utility distribution resource planning processes.
- **NYSERDA 100% Renewables Study, 2017.** Performed project scoping and initial stakeholdering to assess the costs, timing and feasibility of reaching 100% renewable energy production in New York for the New York Energy Research and Development Agency (NYSERDA), in response to the governor of New York's direction.
- **USTDA Clean Energy Project Evaluation, 2017.** Provided advisory services to the Industrial Development Corporation, a South African development bank, including a capacity building workshop on long term grid and distributed system planning.
- **Pumped Hydro Evaluation, Israel, 2017.** Led an economic feasibility study for an Israeli pumped hydro developer to assess project viability and development strategy.
- **USTDA Storage Evaluation Economic Assessment, South Africa, 2015-2016.** Evaluated the economics of storage, estimating system and local level benefits compared with expected storage costs in South Africa. Developed an implementation plan to identify effective storage pilot study opportunities, address the potential challenges to realizing the full value of storage, and determine a pathway to developing a market for cost effective storage applications. Subcontractor to Parsons Engineering.
- **PG&E Storage Strategy, 2016.** Managed development of a storage dispatch optimization tool to investigate the value of behind-the-meter storage to customers and to the utility under customer control and utility control regimes.
- **SMUD PV Integrated Energy Storage, 2015-2016.** Developed integrated distributed energy resources (IDER) models to quantify the operational and distribution planning benefits of customer and utility controlled PV integrated storage. The results were used to design utility sponsored programs that can incentivize retail customers to deploy energy storage with maximum net benefits.
- **Hawaiian Electric Companies, 2015-2016.** Led a study of the technical electricity system limits to integrating additional uncontrolled rooftop PV systems on each of the islands and the integration solutions that could increase them.
- **Emerging Technology Strategy Practice, 2011-2015.** Provided strategic support to renewable energy developers, including project valuation, interconnection evaluation and risk analysis, and transmission congestion and generation curtailment studies. Conducted due diligence and M&A support for clean energy investors.

- **Distributed Energy Resource Evaluation, Tata, Delhi, India, 2014-2015.** Evaluated the benefits and costs of distributed energy resources in Delhi, informing DER business model design and strategy for Tata and Delhi rooftop solar incentive policy.
- **Capturing the Local Avoided Costs of Distributed Energy Resources, PG&E, 2014.** Author of a white paper on how to capture local value from distributed energy resources through deferral of distribution system investments.
- **Resource evaluation of a proposed generator in California, 2014.** Modeled the system operating cost savings from a proposed generator under forecasted future RPS scenarios.
- **Integrated Demand Side Management (IDSMS) Model, Consolidated Edison, 2013-2014.** Led the design and development of an integrated distribution resource planning tool for Consolidated Edison in New York, modeling the operations of, and valuing, generation, energy efficiency, demand response, and storage – winner of a 2014 Utility Analytics Institute Innovation Award.
- **Investigating a Higher Renewables Standard in California, PG&E, SCE, SDG&E, 2013.** Worked with utility stakeholders to model future distributed generation portfolios and their associated costs using the best available information and assumptions, under 40% and 50% RPS scenarios.
- **E3 Renewable Flexibility Model (REFLEX), 2012-2014.** Developed an enhanced unit commitment and dispatch model for capacity and flexible resource planning and operations in systems with large amounts of intermittent resources, using stochastic elements to account for uncertainty.
- **Rate design, BC Hydro and Lower Valley Energy, 2011-2013.** Developed residential and small commercial rate designs, balancing rate design objectives against customer rate impacts.
- **Energy Storage Model, Hydro Storage Developer, 2011.** Designed a mixed integer linear program reservoir storage profit maximization model.
- **California Solar Initiative (CSI) Cost-Effectiveness, CPUC, 2011.** Modeled the Californian interconnection potential and associated cost of distributed solar PV in California at a substation and hourly granularity, evaluating the feasibility of meeting Renewable Portfolio Standard (RPS) targets with large scale distributed PV deployment.
- **Commitment and Dispatch Modeling, El Paso Electric, 2010-2011.** Designed an economic unit dispatch dynamic programming model with commitment of limited operation call options.
- **Revised Transmission Planning Process (RTPP), CAISO, 2010-2011.** Developed renewable resource build out scenarios, assisting CAISO in identifying the required transmission to meet 2020 RPS targets.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.

Consultant as part of Ph.D. studies, Clean Air Markets Division, 2008-2010

- Developed statistical and novel linear programming techniques to metamodel the large scale Integrated Planning Model, providing EPA analysts with intelligent model input selection methods that reduce model run and processing time.

ENERGY RESEARCH CENTER OF THE NETHERLANDS, AMSTERDAM, NETHERLANDS

In collaboration as part of Ph.D. studies, Department of Policy Studies, 2007- 2010

- Designed a stochastic dynamic program and solver to model the costs of power system operation with uncertainty of supply under increasing integration of wind turbine generated electricity.
- Assessed the importance of stochastic modeling approaches for short term electricity unit commitment and dispatch decision making. *On site June - September 2007; June - August 2008*

ACADEMIC PUBLICATIONS

- R. Jones, B. Haley, G. Kwok, J.J. Hargreaves, J Williams, *“Electrification and the Future of Electricity Markets: Transitioning to a Low-Carbon Energy System”*, IEEE Power and Energy Magazine, 2018, 16(4), 79-89.
- A. Olson, E.K. Hart, J.J. Hargreaves, R. Jones, N. Schlag, G. Kwok, N. Ryan, R. Orans, R. Frowd, *“Halfway There: Can California Achieve a 50% Renewable Grid?”*, IEEE Power and Energy Magazine, 2015, 13(4), 41-52.
- A. Olson, R. Jones, E.K. Hart, J. J. Hargreaves, *“Renewable Curtailment as a Power System Flexibility Resource”*, The Electricity Journal, 2014, 27(9), 49-61.
- J. J. Hargreaves, E.K. Hart, R. Jones, A. Olson, *“REFLEX: An Adapted Production Simulation Methodology for Flexible Capacity Planning”*, IEEE Transactions on Power Systems, 2014, 30(3), 1306-1315.
- E. Cutter, B. Haley, J Hargreaves, J. Williams, *“Utility Scale Energy Storage and the Need for Flexible Capacity Metrics”*, Applied Energy, 2014, 124, 274-282.
- C.K. Woo, P. Sreedharan, J. Hargreaves, F. Kahrl, J. Wang, I. Horowitz, *“A Review of Electricity Product Differentiation”*, Applied Energy, 2014, 114, 262-272.
- R. Orans, A. Olson, J. Moore, J. Hargreaves, R. Jones, G. Kwok, F. Kahrl, C.K. Woo, *“Energy Imbalance Market Benefits in the West: A Case Study of PacifiCorp and CAISO”*, The Electricity Journal, 2013, 26(5), 26-36.
- J. J. Hargreaves and B.F. Hobbs, *“Metamodeling of Input-Output Relationships for Complex Power Market Models”*, Energy Systems, 2013, 4(1), 25-45.

- J. J. Hargreaves and B.F. Hobbs, *“Commitment and Dispatch with Uncertain Wind Generation by Dynamic Programming”*, IEEE Transactions on Sustainable Energy, 2012, 3(4), 724-734.
- J. J. Hargreaves and B.F. Hobbs, *“Optimal Selection of Priority Development Areas Considering Tradeoffs between Hydrology and Development Configuration”*, Environmental Modeling and Assessment, 2009, 14(3), 289-302.

EDUCATION

JOHNS HOPKINS UNIVERSITY, Baltimore, MD

Doctor of Philosophy, Geography and Environmental Engineering, May 2010

Master of Science in Engineering, Environmental Management and Economics, May 2007

IMPERIAL COLLEGE, London, United Kingdom

Master of Chemical Engineering – First Class Honors, May 2005